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# APPRENTICESHIP TRAINING

## BOILERMAKER
## Program

Alberta
MANPOWER
Apprenticeship and Trade Certification

DDN 5935362

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## COURSE OUTLINE

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# BOILERMAKER TRADE

## THE GOAL OF APPRENTICESHIP TRAINING

To develop a competent tradesman who, through skill and knowledge may perform the necessary functions required to fabricate, assemble and erect, metal products for Industrial applications and uses.

THE PRODUCT OF APPRENTICESHIP —
a graduate who will:

★ understand the principles of drafting, how drawings originate, their purpose and how to correctly interpret the information therein. The use of each type of drawing, part work order sketches, material lists and specification sheets.

★ layout from drawings to material. Pattern development and template making.

★ relate to all applicable Codes and Regulations with reference to materials specifications, uses and safety for vessels of all types. The acceptable methods of construction for pressure vessels.

★ relate to metallurgy, structural shapes, plate, pipe and pipe fittings. Vessel components, ropes, wire and fibre types, uses and their respective fittings. Materials used with pressure vessels, both metallic and nonmetallic.

★ use hand tools and powered equipment in a proper and safe manner.

★ calculate material quantities.

★ perform a satisfactory operation with oxyacetylene or electric arc welding equipment in order to facilitate this work.

★ relate to the work of other tradesmen in affiliated trades.

# BOILERMAKER TRADE APPRENTICESHIP INFORMATION

## Basic Requirements:

★ Indenture for three periods of Trade experience.

★ Attend an 8 week technical training course in the first period and an 8 week technical training course in both the second and third periods.

★ Fulfill the requirements for each period including 1800 hours of work experience inclusive of time spent at the training course; successfully complete the technical training course and obtain a satisfactory employer's report.

★ Education — all apprentice applicants are required to write an entrance examination.

★ Age — the minimum age for apprentices is 16 years. There is no upper age limit.

## Credits:

★ Accelerated patterns of apprenticeship may be granted for related technical training and/or experience.

## Accreditation:

★ Anyone who has an Alberta Journeyman Certificate in any of the three trades, Steel Fabricator, Boilermaker or Ironworker and wishes to serve an apprenticeship in either of the other two will be awarded 1 year time credit and will be required to either pass the First Period Examination or attend all Technical Training.

★ Anyone who is serving an Alberta Apprenticeship in any of the three trades, Steel Fabricator, Boilermaker or Ironworker and wishes to transfer to either of the other two trades, will be awarded time credit only on the basis of one third of the time served as an apprentice in his original trade.

## Benefits:

★ Apprenticeship is earning while learning program. While working at the trade during apprenticeship, apprentices are assured by regulation of a minimum percentage of journeymen rates: 60% during the first period, 75% during the second period, 90% during the third period. Progress from one rate to the next takes place only after successful completion of all the requirements for each period. (Details are outlined in the Record Book).

★ All apprentices 17 years of age and older are normally eligible for training allowances while attending technical training courses. These allowances are funded by the Canada Employment and Immigration Commission.

★ Administrative procedures establishing the amount of training allowance is complex and can vary with an individual's circumstances. Contact a local Canada Employment Centre for details.

★ An apprentice who successfully completes the program will graduate with an Alberta Completion of Apprenticeship Certificate and a Certificate of Qualification. It is also possible for the graduate to obtain an Interprovincial Red Seal by passing an additional examination and so become recognized as a qualified tradesman throughout Canada.

★ The most significant benefit to the graduate apprentice is that he is well trained in technical and practical aspects of the trade and is able to make a worthwhile and productive contribution to society. Society in return, will provide an opportunity for livelihood.

## DIRECTIONS FOR PROSPECTIVE APPRENTICES

★ Contact your nearest Apprenticeship and Trade Certification office for detailed information and counselling (see list of offices on page 27).

★ Obtain an application form from the Apprenticeship and Trade Certification office and neatly complete, in full, the information requested of the apprentice.

★ Persevere in the search for apprentice employment and upon obtaining employment, give the application to the employer. It should be completed and returned to an Apprenticeship and Trade Certification office forthwith.

★ Any time credit, for previous experience in the Boilermaker trade, should be discussed with the employer and requested on the application form by the employer.

★ Prepare to be called for an entrance examination following submission of your application. You will be advised of the date, time and location.

★ A contract of apprenticeship is entered into between the apprentice and the employer and should be signed within 90 days after the apprentice application has been approved. If contracts have not been issued within this time, contact the Apprenticeship and Trade Certification office.

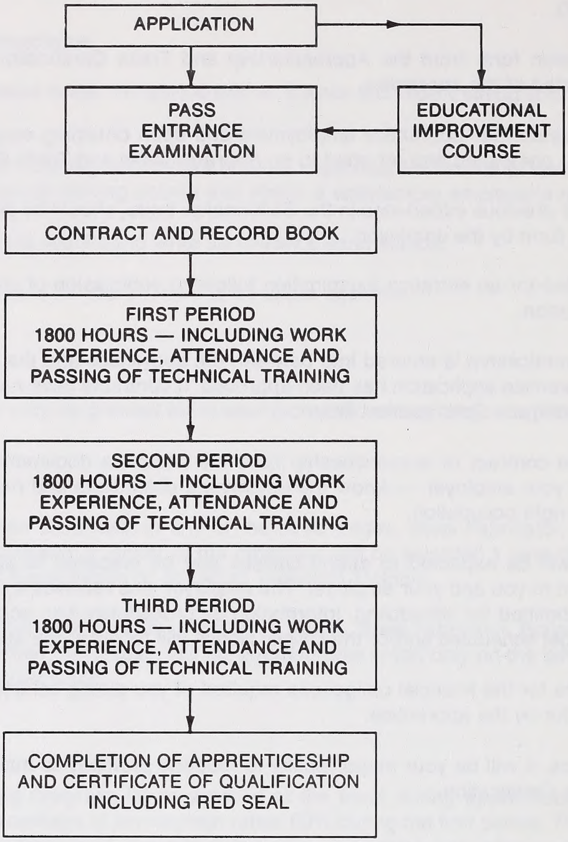
★ Before signing the contract of apprenticeship read the complete document carefully — know your obligations and responsibilities to your employer — know the employer's obligations and responsibilities to you — feel confident you have selected the right occupation.

★ Know when you will be expected to attend classes and be prepared to attend. In early May of each year, School Schedules are sent to you and your employer. The employer also receives a class selection card for you, which is to be completed and submitted for scheduling. Information on procedures also accompanies the above. Confirmation on the date you actually get scheduled and/or the Official Notice will follow at the appropriate time(s).

★ Prepare in advance for the financial obligations required of you during school training. Reference materials and school supplies are paid for by the apprentice.

★ While an apprentice, it will be your responsibility to respond promptly to mailed directions and requests from Apprenticeship and Trade Certification.

## APPRENTICESHIP ROUTE TOWARD CERTIFICATION


APPLICATION
PASS ENTRANCE EXAMINATION
EDUCATIONAL IMPROVEMENT COURSE
CONTRACT AND RECORD BOOK
FIRST PERIOD 1800 HOURS — INCLUDING WORK EXPERIENCE, ATTENDANCE AND PASSING OF TECHNICAL TRAINING
SECOND PERIOD 1800 HOURS — INCLUDING WORK EXPERIENCE, ATTENDANCE AND PASSING OF TECHNICAL TRAINING
THIRD PERIOD 1800 HOURS — INCLUDING WORK EXPERIENCE, ATTENDANCE AND PASSING OF TECHNICAL TRAINING
COMPLETION OF APPRENTICESHIP AND CERTIFICATE OF QUALIFICATION INCLUDING RED SEAL

## APPRENTICESHIP COMMITTEE STRUCTURE

### Boilermaker Provincial Apprenticeship Committee

The Provincial Apprenticeship Committee for the Boiermaker Trade is comprised of members from Local Apprenticeship Committees from the cities of Edmonton and Calgary.

This Committee is concerned with the policies that guide the program and make recommendations to the Apprenticeship and Trade Certification Board and the Executive Director of Apprenticeship and Trade Certification in the following areas:

- ★ Contribute current information relative to changes in the trade and requirements of industry.
- ★ Make recommendations for changes to existing trade regulations.
- ★ Assist in updating of the training program through recommendations for revisions to the course outline and attendant examinations.

### Boilermaker Local Apprenticeship Committee

Local Apprenticeship Committees are concerned with individuals and trade situations within a local region. Meetings are held throughout the year to make recommendations and to discuss problems relating to the apprenticeship program. Members who serve on committees are nominated by employer and labour organizations, and membership is equally divided into employer and employee representation in accordance with The Manpower Development Act.

### Apprenticeship Committee Members:

Mr. D. Lezetc — Edmonton — Employee
Mr. J. DeGraaf — Edmonton — Employer
Mr. J. Missel — Edmonton — Employer
Mr. B. Ashton — Edmonton — Employer
Mr. R. Werner — Edmonton — Employee
Mr. R. Garby — Edmonton — Employee
Mr. R. Shaw — Calgary — Employee
Mr. H. McNamara — Calgary — Employer
Mr. T. Hungle — Calgary — Additional

## BOILERMAKER PROGRAM
## COURSE OUTLINE

This outline has been prepared in accordance with recommendations from the Provincial Apprenticeship Committee for the Boilermaker Trade in the Province of Alberta.

The outline was updated following consideration given to recommendations and suggestions from:

Local Apprenticeship Committees
Representatives from training institutes
Curriculum Sub-Committee from the Provincial Apprenticeship Committee

## PROCEDURES FOR RECOMMENDING REVISION(S) TO THE COURSE OUTLINE

Any concerned citizen or group in the Province of Alberta may make recommendations for change by writing to Apprenticeship and Trade Certification,Edmonton.

It is requested that recommendations for change refer to specific areas and state references used. Recommendations received will be placed before regular meetings of the Provincial Apprenticeship Committee.

## SAFETY EDUCATION

Safe working procedures and conditions, accident prevention and the preservation of health is of primary importance in the Apprenticeship programs in Alberta. These responsibilities are shared and require the joint efforts of the government, employers, employees and the general public. Therefore, it is imperative that all parties become aware of circumstances that may lead to injury or harm and that safe learning experiences and environment can be created by controlling the variables and behaviors that may contribute to or cause an accident and/or an injury.

It is generally recognized that a safe attitude contributes to an accident free environment. As a result a healthy safe attitude towards accidents will benefit an employee by helping to avoid injury, loss of time and loss of pay.

A tradesman is possibly exposed to more hazards than any other person in the work force and therefore, should be familiar with the Occupational Health and Safety Act and Regulations dealing with his own personal safety and the special safety rules applying to each job.

## LEGAL AND ADMINISTRATIVE ASPECTS

**Employer's Responsibilities:**

Accident prevention and the provisions of safe working conditions are the responsibilities of an employer. The company is responsible for:

1. The provision and maintenance of safety equipment
2. The provision of protective devices and clothing (as required by the Occupational Health & Safety Act, General Safety Regulations)
3. The enforcement of safe working procedures
4. Adequate safeguards for machinery, equipment and tools
5. Observance of all accident prevention regulations
6. Adequate training to allow a worker to use or operate equipment in an effective and safe manner.

**Government's Responsibilities:**

Apprenticeship and Trade Certification in conjunction with the respective Provincial Apprenticeship Committee assumes the responsibility to assure that adequate safety is reflected in the curriculum and that adequate safety instruction is presented at the training establishments.

The Occupational Health and Safety Inspection Branch assumes the responsibility for periodic inspection of the operation to ensure that regulations for industry are being correctly observed.

**Individual's Responsibilities:**

The employee is responsible for:

1. Knowing and working in accordance with the safety regulations pertaining to job environment and
2. Working in such a way as not to endanger himself or his fellow employees

The major factor in safety is the individual employee, his personal attitude toward safety and having an awareness of the respective safety regulation.

# BOILERMAKER PROGRAM

## Subjects and Time Distribution

| **First Period** | **8 Weeks** | **30 Hours Per Week** | **240 Hours** |
|---|---|---|---|
| Section One: | Basic Drafting | | 32 |
| Section Two: | Tools, Hand and Power | | 12 |
| Section Three: | Burning and Tack Welding | | 24 |
| Section Four: | Rigging and Related Subjects | | 28 |
| Section Five: | General Safety | | 30 |
| Section Six: | Practical Materials Knowledge | | 14 |
| Section Seven: | Mathematics | | 16 |
| Section Eight: | Trade Technology I | | 40 |
| Section Nine: | Structurals, Plate, Pipe Tubing and Bolts | | 20 |
| Section Ten: | Related Knowledge | | 6 |
| Section Eleven: | Review and Testing | | 18 |

| **Second Period** | **8 Weeks** | **30 Hours Per Week** | **240 Hours** |
|---|---|---|---|
| Section One: | Tools, Hand and Power | | 12 |
| Section Two: | Safety | | 6 |
| Section Three: | Mathematics | | 20 |
| Section Four: | Burning and Tack Welding | | 26 |
| Section Five: | Practical Materials Knowledge | | 14 |
| Section Six: | Trade Technology II | | 66 |
| Section Seven: | Advanced Rigging | | 72 |
| Section Eight: | Review and Testing | | 24 |

| **Third Period** | **8 Weeks** | **30 Hours Per Week** | **240 Hours** |
|---|---|---|---|
| Section One: | Trade Technology III | | 40 |
| Section Two: | Boilers | | 60 |
| Section Three: | Tanks | | 30 |
| Section Four: | Condensers and Exchangers | | 30 |
| Section Five: | Practical Materials Knowledge | | 20 |
| Section Six: | Related Knowledge | | 20 |
| Section Seven: | Review and Testing | | 40 |

## FIRST PERIOD TECHNICAL TRAINING

**SECTION ONE:** **BASIC DRAFTING** **32 Hours**

| TOPIC | COURSE OBJECTIVES |
|---|---|
| | Upon successful completion of each section the apprentice should be able to: |
| **A. Use and Care of Equipment and Drawings** | |
| 1. Drafting equipment | 1. Use minimum drafting equipment to assist in developing principles of drawing construction. |
| 2. Application of scale | |
| 3. Types of drawings, prints and sketches | 2. Read drawings, prints or sketches and properly fold and protect them for immediate and future use. |
| 4. Proper care and method of folding shop and field drawings | 3. Read and interpret the proper use of signs, symbols and abbreviations as may be required on drawings. |
| **B. Types of Lines and Lettering** | |
| 1. Line types and uses | 1. Identify line types and uses, analyze the proper lettering and where it is used relative to the associated terminology. |
| 2. Proper lettering and where used | |
| 3. Terminology of lines | |
| **C. Projections** | |
| 1. Multiview projection | 1. Establish the major principles of projections listed within this topic. |
| 2. Surface and false views | |
| 3. Sections | |
| 4. Materials in section | |
| 5. Right and left hand | |
| 6. Uncommon views | |
| 7. Auxiliary views | |
| 8. Violation of projection | |
| 9. Orthographic projection | |
| 10. Isometric | |
| **D. Technical Sketching** | |
| 1. Materials and techniques used in free hand sketching | 1. Sketch freehand to available materials and techniques used, to convey information to other workmen to produce the subject item, such as small tanks, frames, stands, brackets, etc. |
| 2. Exercises in measuring, sketching and producing a working sketch for items that can be produced by another workman i.e. small tanks, frames, stands brackets, etc. | |
| 3. Introduction to blueprint<br>(a) title block<br>(b) scale<br>(c) contract numbers<br>(d) section on same and different sheets<br>(e) revisions<br>(f) parts and identification marking | |

Interpretation and correlation of information found on multi-sheet complex prints, including material, identification on parts, orientation and layout of structure or parts of a structure utilizing to the fullest actual working prints on vessels, tanks, precipitators and boilers.

TOPIC | COURSE OBJECTIVES

## SECTION TWO: TOOLS, HAND AND POWER 12 Hours

### A. Recognition, Safe Operation and Maintenance of:

1. Hand tools
    - (a) spirit level
    - (b) hammers
    - (c) chisels
    - (d) hacksaws
    - (e) files
    - (f) centre punches
    - (g) various types of squares
    - (h) scribbers
    - (i) dividers
    - (j) chalkline
    - (k) vises
    - (l) trammel points
2. Power tools
    - (a) hand drills
    - (b) electric grinders
    - (c) air grinders
    - (d) pedestal grinders
    - (e) pneumatic chipping hammers

Course objectives:

1. Identify, illustrate or describe the safe operation and maintenance of the tools listed within this section.

## SECTION THREE: BURNING AND TACK WELDING 24 Hours

The instruction under section three, shall not be to the level of a proficient and skilled welder. The intent is to train the apprentice to a level where he may operate the required equipment in a safe manner and perform such operations of metal burning and tack welding as to make temporary attachment of component parts, prior to the finish welding required by certified journeyman welders.

### A. Flame Burning, Oxy-acetylene and Propane

1. Oxy-acetylene equipment
    - (a) cylinders
        - (i) identification of cylinders
        - (ii) cylinder valves
        - (iii) construction and sizes
        - (iv) handling, transporting and storage
        - (v) safety features
        - (vi) faulty cylinders
    - (b) regulators
        - (i) types and identification
        - (ii) proper use and construction
        - (iii) safety features
        - (iv) proper storage and maintenance
    - (c) oxy-acetylene hoses
        - (i) construction sizes
        - (ii) identification of hoses and fittings
        - (iii) safety repair and maintenance
    - (d) cutting tips
        - (i) design and construction
        - (ii) operating principles
        - (iii) care and maintenance
        - (iv) tip cleaners and drills
        - (v) tip selection
    - (e) setting up equipment
        - (i) placement and securing cylinders
        - (ii) clearing and checking cylinders valves

Course objectives:

1. Identify, set up and safely use oxy-fuel cutting and heating equipment.

TOPIC — COURSE OBJECTIVES

    - (iii) precautions taken in checking and attaching regulators
    - (iv) attaching torch
    - (v) correct procedure in checking for leaks
  - (f) gas pressure and flame adjustment
    - (i) regulator adjustment and balancing pressures
    - (ii) backfires and flashbacks
    - (iii) igniting and flame adjustments
    - (iv) shutting down procedures
  - (g) manual cutting
    - (i) torch styles
    - (ii) preheating and starting a cut
    - (iii) practice cuts on various thicknesses
    - (iv) piercing holes and shape cutting
    - (v) straight and bevel cutting

**B. Electric Arc Welding**

1. Introduction to lab
   - (a) proper apparel
   - (b) description of welding helmet and placement of lens
   - (c) proper housekeeping practices
2. Types of machines (manual)
3. Basic electrical theory
   - (a) functions of volts and amperes
4. Familiarization with equipment
5. Controls and settings
6. Electrodes
   - (a) numerical definitions
   - (b) functions of the coating
   - (c) functions of the slag
7. Striking and maintaining an arc
8. Running practice beads
9. Make tack welds (butt and fillet)

Safety precautions should be emphasized prior to, during and after use.

Course objectives:

1. Recognize the various types of electric welding machines, welding rods and safety equipment and to make by tack welds, temporary attachments of component parts.

## SECTION FOUR: RIGGING AND RELATED SUBJECTS 28 Hours

**A. Ropes — Natural and Synthetic Fibre**

1. Types
2. Identification
3. Lays
4. Advantages and Disadvantages
5. Care and Handling
6. Safe use of (SWL) formulas and factors
7. Basic knots
   - (a) identification and uses

Course objectives:

1. Identify types of rope and rope construction.
2. Analyze the advantages and disadvantages.
3. Determine the safe working load and how to care for and handle ropes.
4. Identify and explain the use of the knots named herein under this topic.

| TOPIC | COURSE OBJECTIVES |
|---|---|
| (b) practical exercises<br>(i) bowline<br>(ii) Spanish bowline<br>(iii) clove hitch<br>(iv) half hitch<br>(v) scaffold hitch | |
| **B. Ropes — Wire** | |
| 1. Types and uses<br>2. Classification<br>3. Types of steel<br>4. Lays and preformed<br>5. Safe use of (SWL) formulas and factors | 1. Identify types and uses of wire ropes.<br>2. Identify wire rope classification and construction.<br>3. Identify or explain the types of slings and chokers used in wire rope lifting.<br>4. Calculate the safe working load for all wire rope configurations. |
| **C. Lifting Devices** | |
| 1. Identification of crawlers and mobiles<br>(a) hydraulic<br>(b) conventional<br>(c) cherry pickers<br>(d) air hoists<br>(f) comealong<br>(g) tirfor<br>2. Identification of components<br>3. Safety precautions | 1. Recognize and explain the difference between hydraulic, conventional and rough terrain type cranes.<br>2. Identify air hoists, chain falls, comealongs and tirfors and describe the safety precautions for each piece of equipment. |
| **D. Signals** | |
| 1. Hand<br>(a) used for moving equipment<br>(b) for all types of hoisting<br>(c) methods and precautions<br>2. Bell<br>(a) types of systems<br>(b) ringing codes<br>(d) emergency procedures<br>3. Voice (communication)<br>(a) radio (walkie-talkie 2 way)<br>(b) intercom (station to station) | 1. Affect communications with other workers through the use of all hand and bell signals and other communication devices involved in the safe and precautionary methods used in moving equipment with varying types of hoisting practices. |
| **SECTION FIVE:** | **GENERAL SAFETY** **30 Hours** |
| **A. Causes of Accidents and Prevention** | |
| 1. Electrical hazards (tagouts, etc.)<br>2. Explosive and poisonous vapours | 1. Demonstrate or describe the causes and prevention of accidents and prevention of potential electrical hazards and explosive and poisonous vapors. |
| **B. Proper Use of Safety Equipment** | |
| 1. Helmets<br>2. Boots<br>3. Glasses<br>4. Goggles<br>5. Safety belt<br>6. Clothing<br>7. Dust filters<br>8. Oxygen masks | 1. Demonstrate the proper use of all safety equipment listed within this topic. |

| TOPIC | COURSE OBJECTIVES |
|---|---|
| 9. Fume exhausters | |
| 10. Safety showers | |
| 11. Fire fighting equipment | |
| **C. Proper Lifting and Handling of Materials (Manual)** | |
| 1. Smooth heavy loads | 1. Describe or demonstrate the proper way to lift and handle materials of varying load situations. |
| 2. Long flexible loads | |
| 3. Off balance loads | |
| 4. Heavy fragile units | |
| **D. Workers' Compensation Board** | |
| 1. Form to be filed | 1. Complete and remit the appropriate forms as may be required by the W.C.B. |
| 2. Method of completing | |
| 3. Where to remit | |
| **E. St. John Standard First Aid** | |
| 1. Principles of first aid | 1. Administer standard first aid treatment as prescribed by the St. John's First Aid course and objectives. |
| 2. Dressings, bandages and slings | |
| 3. Bandaging special areas | |
| 4. Cardio-respiratory systems | |
| 5. Oral resuscitation | |
| 6. Sylvester and Holger Nielson artificial resuscitation | |
| 7. Wounds, bleeding and shock | |
| 8. Special wounds (i.e. abdominal chest and scalp) | |
| 9. Structure and functions of the body | |
| 10. Injuries to the muscles, joints and bones | |
| 11. Fractures of the upper limbs | |
| 12. Fractures of the lower limbs | |
| 13. Fractures of the ribs, pelvis and foot | |
| 14. Inuries to the head, neck and unconscious casualties | |
| 15. Neck and spinal injuries | |
| 16. Heat and cold injuries | |
| 17. Injuries to the eyes and handling of casualties | |
| 18. Heat illnesses and diabetes | |
| 19. Poisons and miscellaneous injuries | |
| 20. Heart attacks and stroke | |
| 21. Review of artificial resuscitation | |
| 22. Review of casualty care and bleeding | |
| 23. Review of fractures | |
| 24. Examination | |

## SECTION SIX: PRACTICAL MATERIALS KNOWLEDGE 14 Hours

| | |
|---|---|
| **A. Elements of** | |
| 1. Steel | 1. Name the major elements in steel, cast iron, bronze and copper alloys. |

| TOPIC | COURSE OBJECTIVES |
|---|---|
| 2. Cast Iron | |
| 3. Bronze | |
| 4. Copper alloys | |
| **B. Manufactures of Steel** | |
| 1. Types of furnaces | 1. Name the types of furnaces used to manufacture steel and describe the rolling procedures. |
| 2. Rolling | |
| 3. Marking | 2. Interpret markings on steel and determine steel grades and specifications. |
| 4. Grades specifications | |
| **C. Properties of Steel** | |
| 1. Mechanical | 1. Measure and calculate hardness, toughness and ductility of steel and determine its workability. |
| 2. Physical | 2. Identify steel by its physical properties of color, weight and conductivity. |
| **D. Types of Steel** | |
| 1. Alloys | 1. Explain what alloys are in steels and the uses and weldability of steel. |
| 2. Uses | |
| 3. Weldability | |
| 4. Trade names | |

## SECTION SEVEN: MATHEMATICS 16 Hours

Mathematics has been determined as being an integral component of the technical training when it is applied in the strictest terms of trade involvement specifically being totally related. Due to the nature of application in the trade of Boilermaker, the mathematics given under this section shall be flexible and applied to the work where feasible.

| | |
|---|---|
| **A. Basic Mathematics** | |
| 1. Whole numbers | 1. Apply basic math skills to solve problems associated with the trade. |
| 2. Fractions | |
| 3. Decimals | |
| 4. Linear measurements | |
| 5. Ratio and proportion | |
| 6. Area and volume<br>(a) basic formulas and constants | |
| 7. Square root | |
| 8. Metric<br>(a) lengths<br>(b) mass<br>(c) volume | |

## SECTION EIGHT: TRADE TECHNOLOGY I 40 Hours

| | |
|---|---|
| **A. Identification of Vessels** | |
| 1. Boiler and exchanger identification<br>(a) types of boilers<br>(i) fire tube<br>(ii) water tube<br>(b) types of exchangers<br>(i) single pass<br>(ii) multi-pass | 1. Identify watertube and firetube boilers as well as single pass and multi-pass heat exchangers.<br>2. Become familiar with the more common types of codes governing the construction of boilers and pressure vessels. |

| TOPIC | COURSE OBJECTIVES |
|---|---|
| **B. Introduction to Layout** | |
| 1. Tools<br>2. Basic geometry<br>3. Parallel line method forsimple plate structure. | 1. Develop a pattern using parallel line method for a single plate structure with the use of basic geometry and layout tools. |
| **C. Material Preparation and Assembly** | |
| 1. Correct and recommended procedure for<br>(a) marking<br>(b) burning<br>(c) drilling<br>(d) bending<br>(e) rolling<br>(f) forming<br>Lectures and supporting shop practices on the progressive preparation of materials for the proper sequence to successfully fabricate a small project beginning with the print and selection of materials to the finished project.<br>2. Signs symbols and abbreviations on drawings for<br>(a) material preparation<br>(b) structural and plate<br>(c) vessels<br>(d) storage and bulk tanks<br>(e) power boilers<br>(f) heat exchangers<br>(g) precipitators | 1. Prepare and assemble material to be fabricated using proper sequence and/or procedure. |

**SECTION NINE: STRUCTURALS, PLATE, PIPE, TUBING AND BOLTS 20 Hours**

| | |
|---|---|
| **A. Structural Shapes** | |
| 1. Identification<br>2. Designations (old and new)<br>3. Dimensioning | 1. Identify all structural shapes by their respective designations (old and new).<br>2. Explain specific dimensions of parts of structural shapes as per the designations. |
| **B. Plate and Sheet** | |
| 1. Identification of gauges<br>2. Carbon<br>3. Alloys<br>4. Clads and cladding<br>5. Mill heat slab numbers<br>6. Mesh grating expanded metal grating | 1. Decipher the identification numbers and decide what type of material and gauge thickness of plate or sheet steels. |
| **C. Pipe and Tubing** | |
| 1. Identification of types<br>2. Sizes<br>3. Material specifications<br>4. Cutting to size for<br>(a) fitting<br>(b) threading | 1. Identify the type and size of all pipe and tubes.<br>2. Demonstrate the ability to cut pipe or tube to size for fitting or threading as may be required. |

| TOPIC | COURSE OBJECTIVES |
|---|---|
| **D. Bolts** | |
| 1. Sizes<br>2. Nut and bolt marking<br>3. Wrench sizes<br>4. American standard and metric sizes | 1. Interpret nut and bolt markings to determine physical properties and type of material they are made of. |
| **E. Welding and Special Fittings** | |
| 1. Welding fittings<br>(a) nozzles<br>(b) tube turns<br>(c) slip ons<br>(d) couplings<br>(e) tees<br>(f) elbows<br>(g) flanges and blanking plates<br>(h) welding neck<br>(i) plugs<br>(j) valves<br>2. Special fittings<br>(a) heads<br>(b) manways<br>(c) davits<br>(d) trays<br>(e) domes<br>(f) hand holes<br>(g) repads<br>(h) grabs<br>(i) demisters<br>(j) vortex breakers | 1. Identify the 10 named welding fittings listed under this topic and describe their function. |

## SECTION TEN: RELATED KNOWLEDGE 6 Hours

| | |
|---|---|
| **A. Responsibilities** | |
| 1. To oneself, fellow workers and the public<br>2. To the foreman and employer<br>3. To the Apprenticeship and Trade Certification Branch<br>4. Work opportunities | 1. Recognize and assess the responsibilities to oneself, fellow workers, supervisory personnel, appropriate trade related agencies and work opportunities. |
| **B. Public Relations** | |
| 1. Co-operation with allied trades<br>2. Co-ordination with other trade functions<br>3. Recognition of problems in all phases<br>4. Consideration of public needs | 1. Determine good public relations with allied and other trades as well as problems and public needs. |

## SECTION ELEVEN: REVIEW AND TESTING 18 Hours

**A. Review of All Subjects Taken, Both Theory and Shop**

Special emphasis to be placed on weak areas that are brought to light by progressive tests and examinations administered by the training school throughout the course.

**B. Final theory test administered by the Apprenticeship and Trade Certification to establish first period technical credits.**

# SECOND PERIOD TECHNICAL TRAINING

## SECTION ONE: TOOLS, HAND AND POWERED

**12 Hours**

SUBJECT/TOPIC

COURSE OBJECTIVES

Upon successful completion of each section the apprentice should be able to:

### A. Instruments

1. Transit
2. Water level
3. Micrometers

1. Demonstrate the use of the transit and water level in laying out fittings and piping.

### B. Power Tools (Electric and Pneumatic)

1. Drills
2. Impacts
3. Tube expanders (recognition)
4. Reamers

1. Demonstrate the proper and effective use of all tools (hand or powered) as listed in this section.

### C. Shop Equipment

1. Drill (post and radial)
2. Rolls
3. Punches
4. Brakes
5. Presses

## SECTION TWO: SAFETY

**6 Hours**

A general review of first year material, section five with emphasis on explosive and poisonous fumes.

## SECTION THREE: MATHEMATICS

**20 Hours**

Mathematics has been determined as being an integral component of the technical training when it is applied in the strictest terms of trade involvement, specifically being totally related.

### A. Mathematics

1. Review of all first year material in section 7.

1. Apply math calculations required in the principles for bending steels.
2. Solve mathematical problems related to the trade.

## SECTION FOUR: BURNING AND TACK WELDING

**26 Hours**

**A.** The correct procedures to complete a job from a drawing to the finished project (including welding as directed by the instructor). All projects should create interest and student challenge. The projects shall employ:

1. Drawings
2. Layout tools
3. Marking
4. Burning
5. Grinding
6. Forming or bending
7. Fitting
8. Tacking
9. Welding (as instructed)

1. Know the correct procedures to complete a job from a drawing to the finished project.

| TOPIC | COURSE OBJECTIVES |
|---|---|
| **B. Flame Cutting** | |
| 1. Review of first year safety and procedure<br>2. Advanced theory<br>3. Flame straightening<br>4. Cutting practices on<br>(a) structurals<br>(b) pipe<br>(c) vessels<br>(d) miscellaneous shapes<br>5. Starting a cut by piercing a hole, the forming a bolt hole to size or fitting opening to shape. | 1. Apply flame straightening procedures to straighten bent or curved metal objects such as angles, beams, pipes, etc.<br>2. Demonstrate efficient cutting practices to flame cut structurals, pipes, vessels and miscellaneous shapes.<br>3. Pierce and cut a bolt hole to size using a cutting torch. |
| **C. Electric (Arc) Welding** | |
| 1. Review first year material<br>2. Plate edge and joint preparation<br>3. Arcair gouging<br>(a) demonstration<br>(b) familiarization<br>4. Fit up and tack for welding<br>5. Welding symbols<br>(a) parts<br>(b) material preparation<br>(c) weld types<br>(d) dimensioning<br>(e) position<br>(f) execution (field or shop)<br>(g) finish (flush, chip grind) | 1. Demonstrate proper arcair gouging techniques.<br>2. Interpret welding symbols used for fabrication. |

## SECTION FIVE: PRACTICAL MATERIALS KNOWLEDGE 14 Hours

**A. Properties of Steel and its Microstructures**

| | |
|---|---|
| 1. Physical<br>2. Mechanical<br>3. Control of expansion and contraction<br>4. Effects of alloys on the burning action<br>6. Heat treatment (stress relieving)<br>7. Heat straightening<br>8. Forming<br>9. Hot and cold working | 1. Demonstrate and/or explain how to control expansions and contraction.<br>2. Explain the effects of alloys on burning action.<br>3. Explain pre and post heat treatments, forming hot and cold working. |

Note:
The areas under Practical Materials Knowledge shall be kept at a level of reasonable understanding by the apprentice and shall be of useful knowledge readily applicable to his work. The intent is not to advance to a Metallurgist status but rather acquaint the apprentice with a knowledge he can apply, and provide him with a working understanding of metal properties.

## SECTION SIX: TRADE TECHNOLOGY II 66 Hours

**A. Review of First Year Material Trade Technology I including drawings, symbols, sketching fittings and fasteners.**

**B. Advanced Blueprints for Fabrication**

1. Vessels

| TOPIC | COURSE OBJECTIVES |
|---|---|
| 2. Tanks<br>3. Boilers | |
| **C. Advanced Blueprints for Erection Procedures** | |
| 1. Vessels<br>2. Tanks<br>3. Boilers | 1. Demonstrate or describe how to fabricate and erect vessels, tanks and boilers from blueprint reading interpretation skills.<br>2. Demonstrate or describe how to erect vessels, tanks and boilers from blueprint reading interpretation skills. |
| **D. Layout** | |
| 1. Review of all first year material in section eight<br>2. Introduction to<br>(a) complex tools<br>(b) formulas<br>(c) advanced geometry<br>(d) parallel and radial lines<br>3. Exercise in<br>(a) nozzle layout on vessels<br>(b) component part locations<br>(c) plate fabrication layout<br>4. Introduction to triangulation on concentric cones and rectangles | 1. Demonstrate or describe nozzle layout on vessels, location of component parts, plate fabrication layout, layout by triangulation for concentric cones and rectangles with the use of complex tools, formulas, advanced geometry and parallel and radial line procedures whenever applicable. |

## SECTION SEVEN: ADVANCED RIGGING 72 Hours

| TOPIC | COURSE OBJECTIVES |
|---|---|
| **A. Review of First Year Material, Section Four** | |
| **B. Wire Rope** | |
| 1. Inspection<br>2. Fittings<br>(a) i.d. of hooks<br>(b) clips<br>(c) shackles<br>3. Formulas for SWL of fittings<br>4. Slings and chokers<br>(a) uses<br>(b) types<br>(c) stresses<br>(d) tables and inspection<br>5. Drums<br>(a) capacity formula<br>(b) fleet angle<br>(c) spooling procedures | 1. Demonstrate or describe safe work practices for wire rope inspection wire rope fittings, slings, chokers and drums.<br>2. Describe the safe working loads derived from formulas to calculate same for all of the previously mentioned parts. |
| **C. Block and Tackle** | |
| 1. Uses<br>2. Types<br>3. Components<br>4. Reeving<br>(a) square<br>(b) skip<br>(c) tandem<br>(d) equalizer sheaves<br>5. Reeving of simple and multi-blocks up to 24 parts | 1. Demonstrate or describe safe work practices of block and tackle involving reeving techniques.<br>2. Calculate the mechanical advantage of block and tackle systems. |

| TOPIC | COURSE OBJECTIVES |
|---|---|
| 6. Mechanical advantage<br>(a) simple and compound systems<br>(b) computing mechanical advantage<br>(c) friction<br>(d) line stress<br>(e) lead line stress<br>(f) use of fairleads and friction | |
| **D. Gin Poles** | |
| 1. Uses<br>2. Erection<br>3. Vessel lifts<br>4. Disassembly<br>5. Guy line anchorage | 1. Describe the uses, the erection procedures, the safe operation and the disassembly procedures for gin poles. |

Note:
Gin poles should be taught to a limited extent due to the increase of mobile crane capacities.

| TOPIC | COURSE OBJECTIVES |
|---|---|
| **E. Cranes** | |
| 1. Mobile hydraulic cranes and cherry pickers<br>(a) general uses<br>(b) set up procedures<br>(c) use of tables<br>(d) signals | 1. Demonstrate or describe the set up procedures and uses of mobile hydraulic cranes and cherry pickers. |
| 2. Conventional truck cranes<br>(a) general uses<br>(b) set up procedures<br>(c) boom assembly and disassembly<br>(d) components<br>(e) use of tables<br>(f) signals | 1. Demonstrate or describe the assembly and disassembly of booms and the set up procedures and uses of conventional truck cranes. |
| 3. Crawler cranes<br>(a) railway car off loading and assembly<br>(b) boom assembly<br>(c) general use<br>(d) set up and assembly<br>(e) use of tables<br>(f) signals<br>(g) components<br>(h) breakdown for transportation<br>(i) safety precautions<br>(j) special emphasis on<br>(i) ultra high capacity cranes<br>(ii) sky horse<br>(iii) ringer | 3. Demonstrate or describe railway car off loading, boom and set up assembly, the general use and the breakdown procedures for transportation of crawler cranes, with emphasis on ultra high capacity cranes, such as a sky horse (limited swing) and a ringer (360 rotation). |
| **F. Identification and use of** | |
| 1. Stiff leg derrick<br>2. Guy derrick | 1. Explain the general uses and differences of a stiff leg and guy derricks. |
| **G. Hoisting Equipment** | |
| 1. Proper use of<br>(a) chain falls<br>(b) tirfors<br>(c) comealongs | 1. Describe the proper use of chain falls, tirfors and comealongs. |

| TOPIC | COURSE OBJECTIVES |
|---|---|
| 2. High lines<br>(a) uses<br>(b) safety hazards<br>(c) stress calculations | 1. Calculate stress and explain the uses and safety hazards of high lines. |
| 3. Air tuggers<br>(a) use of tuggers in a power house<br>(b) block location<br>(c) signals | 1. Explain the use of air tuggers in a power house or block location, and the use of signals. |
| **H. Scaffolds** | |
| 1. Set up<br>2. Plank inspection<br>3. Plank placing and securing<br>4. Ladder<br>5. Swing scaffolding<br>6. Suspended scaffolding<br>7. Needle beams | 1. Describe the complete set up of all scaffolds and needle beams. |
| **I. Rigging Prints for Crane and Pole Positioning** | |
| | 1. Interpret from a rigging print the information required to position a crane or pole for any lift operation. |

**SECTION EIGHT: REVIEW AND TESTING 24 Hours**

**A. Review of all subjects taken both theory and shop. Special emphasis to be placed on weak areas that are brought to light by progressive tests and examinations administered by the training school throughout the course.**

**B. Final theory test to be administered by the Apprenticeship and Trade Certification to establish second period technical credit.**

# THIRD PERIOD TECHNICAL TRAINING

## SECTION ONE: TRADE TECHNOLOGY III 40 Hours

TOPIC

COURSE OBJECTIVES

Upon successful completion of each section the apprentice should be able to:

### A. Advanced Fabrication — Erection and Blueprints of

1. Layout of holes
    - (a) square
    - (b) round
    - (c) elliptical
2. Layout for bending and rolling
    - (a) roll or break capacity
    - (b) direction of rolling or bend
    - (c) bend allowances
    - (d) material preparation prior to rolling or bending
3. Template development
    - (a) review of geometry and basic layout
    - (b) parallel lines
    - (c) radial lines
    - (d) triangulation
4. Fitting of plate units
    - (a) layout on plate units
    - (b) assembly sequences
    - (c) setting square and to required angles
    - (d) supporting
5. Fitting of pipe and shell sections with components
    - (a) layout procedures
    - (b) assembly
    - (c) tools and fitting aids
    - (d) misalignment allowance
    - (e) shells to shells
    - (f) heads to shells
    - (g) layout on shells
    - (h) layout on heads
    - (i) repads and nozzles
    - (j) trayrings and downcomer bars
    - (k) ladder and platform clips
    - (l) davits
    - (m) skierts or bases
    - (n) miscellaneous components

1. Interpret blueprints to layout and fabricate square, round and eliptical holes: prepare plate, determine roll and brake capacity and allowances and proper direction to roll or bend.
2. Develop templates using geometry, parallel lines, radial lines and triangulation using these templates to lay out on plate in the proper sequence by setting square and to required angles and supporting same.
3. Fit pipes and shell section components from blueprints by using the proper layout procedure, assemble with the proper tools and fitting aids, know the misalignment allowances, fit shell to shells, heads to heads, layout on shells, heads, repads and nozzles, fit tray rings and downcomer bars, ladder and platform clips, davits, skirts or bases and all other miscellaneous components.

## SECTION TWO: BOILERS 60 Hours

### A. Review of Boilers

### B. Erection Components — Identification, Rigging and Fitting Procedures of

1. Structure
2. Drums
3. Headers
4. Tubes
5. Platins
6. Buck stays
7. Casing
8. Firedoor

1. Describe rigging and fitting procedures of the erection of component parts of boiler as listed herein under this topic.

| TOPIC | COURSE OBJECTIVES |
|---|---|
| 9. Super heater elements | |
| 10. Reheat elements | |
| 11. Economizer | |
| 12. Air heater | |
| 13. Deaerator | |
| 14. Water treatment | |
| **C. Tube Installation, Equipment and Rolling** | |
| 1. Preparation of tube sheets | 1. Describe Boiler tube installation procedures, Boiler tube rolling procedures and proper use of equipment. |
| 2. Tube sizes | |
| 3. Tube material | |
| 4. Annealing | |
| 5. Expanding limits | |
| 6. Fit up of tube | |
| 7. Tube bending | |
| 8. Seal welding | |
| 9. Tack tubes | |
| 10. Self feed expander | |
| 11. Retractive | |
| 12. Lubrication | |
| 13. Mandrels | |
| 14. Over rolling | |
| 15. Under rolling | |
| 16. Micrometers and gauges | |
| 17. Belling | |
| 18. Ferrules | |
| 19. Repairing leaks | |
| 20. Testing | |
| **D. Auxiliary Boiler Equipment** | |
| 1. Airducts | 1. Describe the purpose of the auxiliary boiler equipment as listed herein under this topic. |
| 2. Stacks and breeching | |
| 3. Condenser | 2. Describe the testing procedures and codes used for this equipment. |
| 4. Fans, I.D. and F.D. | |
| 5. Intake and discharge lines | |
| 6. Precipitators | |
| 7. Pulverizers | |
| 8. Stokers | |
| 9. Burners | |
| 10. Testing and codes | |

Note:
The boiler print course should be complemented by boiler components and erection procedure practice, where suitable shop equipment and time will permit.

## SECTION THREE: TANKS 30 Hours

### A. Types of Material

| | |
|---|---|
| 1. Carbon steel | 1. Know and identify the different types of materials described under this topic. |
| 2. Alloy steel | |

| TOPIC | COURSE OBJECTIVES |
|---|---|
| 3. Nonferrous metals | |
| 4. Gauges and plates | |
| 5. Mesh and screen | |
| **B. Preparation for Welding** | |
| 1. Plate edge preparation | 1. Prepare these materials for welding by proper preparation, spacing alignment and safety. |
| 2. Spacing | |
| 3. Alignment | |
| 4. Back up | |
| 5. Safety precautions | |
| **C. Types of Tanks** | |
| 1. Vertical and horizontal (cylindrical) | 1. Describe the differences of the 5 listed types of tanks under this topic. |
| 2. Closed top or open (vented) | |
| 3. Elevated spheres | |
| 4. Penstock | |
| 5. Scroll cases | |
| **D. Types of Roofs** | |
| 1. Cone | 1. Describe the three different types of roofs listed under this topic. |
| 2. Hemispherical | |
| 3. Floating | |
| **E. Types of Floors** | |
| 1. Flat (butt or lap) | 1. Describe the three different types of floors listed under this topic. |
| 2. Orange peel | |
| 3. Hopper | |
| **F. Erection Equipment** | |
| 1. Cranes, gin poles, etc. | 1. Describe the uses of balance beams, knee braces, key plates, clamps, dogs and wedges as used in tank construction. |
| 2. Tuggers | |
| 3. Balance beam | |
| 4. Wire rope accessories | |
| 5. Knee braces, planks | |
| 6. Key plates, clamps, dogs, wedges, etc. | |
| **G. Erection Procedures** | |
| 1. Site preparation | 1. Describe the complete tank erection procedures of the components listed herein under this topic. |
| 2. Floor | |
| 3. First shell ring | |
| 4. Succeeding rings | |
| 5. Top angle | |
| 6. Roof supports and roof | |
| 7. Ladders, stairways, platforms etc. | |
| 8. Shell fittings | |
| 9. Testing and repairs if required | |

**SECTION FOUR:** **CONDENSERS AND EXCHANGERS** **30 Hours**

| TOPIC | COURSE OBJECTIVES |
|---|---|
| **A. Types** | |
| 1. Single pass | 1. Recognize single pass and multi pass condensers and exchangers and their purpose. |
| 2. Multi pass | |
| 3. Purposes | |
| **B. Tubes** | |
| 1. Rolled | 1. Explain advantages and disadvanges of rolled and welded tubes according to types of material being used. |
| 2. Welded | |
| 3. Materials | |
| **C. Shell** | |
| 1. Baffles | 1. Explain the purpose of the baffles and tube sheets and types of materials used. |
| 2. Tube sheets | |
| 3. Materials | |
| **D. Heads** | |
| 1. Various types | 1. Explain the differences of the various types of heads used for exchangers. |
| **E. Tube Rolling Procedure** | |
| 1. Tube sheet layout | 1. Describe tube rolling procedures for condensers and exchangers. |
| 2. Number of tubes | |
| 3. Type of metals | |
| 4. Length of tubes | |
| 5. Diameter of tubes (O.D.) | |
| 6. Wall thickness of tubes | |
| 7. Sheet of header thickness | |
| 8. Expansion required | |
| 9. Lubrication | |
| **F. Rolling Equipment** | |
| 1. Compressor | 1. Describe rolling equipment listed herein to install condenser and exchange tubes. |
| 2. Air motor | |
| 3. Electric motor | |
| 4. Tube end mills | |
| 5. Tube expanders | |
| 6. Roll and mandrels | |
| 7. Fly cutters | |
| 8. Tube cutters | |
| 9. Tube cleaning | |
| 10. Tube removal tools | |
| 11. Micrometers | |
| 12. Torque wrench | |
| 13. Explosive process | |
| **G. Repair of Exchangers** | |
| 1. Testing | 1. Describe the procedure to locate, remove, replace and test for defects when making repairs to exchangers. |
| 2. Location of faulty tubes | |
| 3. Removal of tubes | |

| TOPIC | COURSE OBJECTIVES |
|---|---|
| 4. Safety precautions | |
| 5. Plugs | |
| 6. Testing and draining | |

## SECTION FIVE: PRACTICAL MATERIALS KNOWLEDGE 20 Hours

**A. Review of First Year Material, Section Six**

**B. Review of Second Year Materials, Section Five**

**C. Testing of Materials**

| | |
|---|---|
| 1. Destructive | 1. Describe destructive tests and nondestructive tests. |
| (a) pull (tensile) | |
| (b) bend (impact) | |
| (c) elongation (ductability and brittleness) | |
| 2. Nondestructive | |
| (a) x-ray | |
| (b) ultrasonic | |
| (c) dye penetrant | |
| (d) hydrostatic | |
| (e) vacuum and air | |

**D. Heat Treatment**

| | |
|---|---|
| 1. Methods | 1. Explain methods and effects of heat treatment. |
| (a) oxyacetylene flame | 2. Explain what post heat treatments are for. |
| (b) natural gas and compressed air | |
| (c) annealing furnace or ovens | |
| 2. Effects | |
| (a) expanding and shrinking | |
| (b) stress relieving | |
| (c) annealing | |
| (d) normalizing | |
| (e) preheating | |
| (f) post heating | |

**E. Inspection**

| | |
|---|---|
| 1. Visual | 1. Describe various inspection techniques such as; visual dimensional, drawing reference checks and utilizing quality control procedures. |
| (a) damage to head and/or shell | |
| (b) damage to components | |
| (c) alignments | |
| 2. Dimensional | |
| (a) positions | |
| (b) insertions | |
| (c) thickness | |
| (d) protrusions | |
| (e) overall dimensions | |
| (f) sizes | |
| 3. Drawing reference checks | |
| (a) components types | |
| (b) position fittings | |
| (c) surface finish | |
| 4. Quality and production flow | |
| (a) quality of work | |
| (b) fit up procedure | |
| (c) accuracy of dimensions | |
| (d) loss of time procedures | |
| (e) methods of improving production | |
| (f) types of protection (paints, blanking, plates, plugs and protectors) | |

| TOPIC | COURSE OBJECTIVES |
|---|---|
| (g) markings<br>(h) shipping aids and instructions | |

### SECTION SIX: RELATED KNOWLEDGE 20 Hours

| TOPIC | COURSE OBJECTIVES |
|---|---|
| **A. Reports** | |
| 1. Letter of application for employment<br>2. Work orders — content | 1. Interpret and explain the content of work orders and file letters of application for employment. |
| **B. Written Orders** | |
| 1. Invoices<br>2. Delivery slips<br>3. Purchase orders<br>4. Shipping and receiving procedures | 1. Interpret and explain written orders and information contained on invoices, delivery slips, purchase orders and shipping and receiving procedures. |
| **C. Communications On The Job** | |
| 1. Amongst workers<br>2. Amongst workers and management<br>3. Project progress reports | 1. Demonstrate effective communications amongst workers, management and for project progress reports. |
| **D. Guest Speakers and Plant Tours** | |
| 1. Speakers<br>(a) unions<br>(b) management<br>(c) Apprenticeship and Trade Certification<br>(d) product representatives (subject authorities)<br>2. Plant tours<br>(a) steel fabrication shops (vessel and structural)<br>(b) rolling mills (available types)<br>(c) operational job sites (with permitting authority)<br>(d) foundries (when and where time permits) | 1. Explain the responsibilities of the various agencies affiliated with the trade.<br>2. Explain the differences among fabrication shops, rolling mills, operational job sites and foundries. |

### SECTION SEVEN: REVIEW AND TESTING 40 Hours

**A. Review of all the major subjects taken in all years, first second and final third year. The instructor/s shall place emphasis on all weak areas that have shown up by the in school progressive test and examinations. The material shall be the instructor/s prerogative and the duration of each subject shall be governed by the needs of each individual class of apprentices.**

**B. A final theory examination administered by the Apprenticeship and Trade Certification, shall test the apprentice for the right to be the holder of a Journeyman Boilermaker Certificate.**

## SUGGESTED REFERENCE MATERIALS

Boilermaking Manual — Province of British Columbia

The Pipe Fitters and Pipe Welders Handbook — Thomas W. Frankland — The Bruce Publishing Co.

Steel Handbook — Dominion Bridge — Seventh Edition 1978

Tube Turns — Chemtron Corporation

Handbook for Riggers — W.C. Newberry

The Construction Boilermaker — Boilermakers Education Program — Ontario

Metal Trades Handbook

Excerpts form the A.S.M.E. Boiler and Pressure Vessel Code pertaining to Pressure Vessels and Welding Qualifications

Mathematics for Sheet Metal Fabrication — Delmar Publication

## TECHNICAL TRAINING SCHOOLS

The Boilermaker Apprenticeship training program is offered by Alberta Manpower, Apprenticeship and Trade Certification. Staff and facilities for teaching the program are supplied by:

1. Westerra Institute of Technology

## LOCATION OF APPRENTICESHIP AND TRADE CERTIFICATION REGIONAL OFFICES

BONNYVILLE

CALGARY

EDMONTON

FORT McMURRAY

GRANDE PRAIRIE

HINTON

LETHBRIDGE

MEDICINE HAT

PEACE RIVER

RED DEER

VERMILION

GOVERNMENT OF THE PROVINCE OF ALBERTA

# ALBERTA REGULATION 91/80

*(Filed on March 14, 1980)*

THE MANPOWER DEVELOPMENT ACT

DEPARTMENT OF ADVANCED EDUCATION AND MANPOWER

## MINISTERIAL ORDER

I, James D. Horsman, Minister of Advanced Education and Manpower, pursuant to sections 30(2) and 37(2) of The Manpower Development Act, hereby make regulations in the Appendix attached hereto, being the Boilermaker Trade Regulation.

Dated at the City of Edmonton, in the Province of Alberta, this 12th day of March, 1980.

JAMES D. HORSMAN,
Minister of Advanced Education and Manpower.

## APPENDIX

## THE MANPOWER DEVELOPMENT ACT

### Boilermaker Trade Regulation

1(1) In this regulation

(a) "boilermaker" means a person engaged in the fabrication, erection, repair and maintenance of dust, air, steam, oil, water or other liquid tight containers, structures or equipment;

(b) "General Regulations" means the General Regulations (Alta. Reg. 43/77) as amended;

(c) "trade" means the trade of boilermaker.

(2) The definitions in the General Regulations apply in this regulation.

## PART 1

## APPRENTICESHIP AND TRADE TRAINING

2 A person is eligible to be an apprentice boilermaker if he has

(a) satisfied the requirements of section 5 of the General Regulations, and has

(b) passed an entrance examination prescribed by the Board.

3(1) Subject to subsections (2), (3) and (4), an employer who is a journeyman or employs a journeyman, may employ one apprentice and may employ one additional apprentice for every 3 additional journeymen he employs.

(2) If the supply of journeymen in a location where an employer is carrying on business is insufficient to permit the employer to carry out his work commitments, the Director may authorize the employer to employ apprentices in addition to subsection (1).

(3) The Director may authorize an employer to employ an apprentice, in addition to those under subsections (1) and (2), on a temporary basis to train him in a branch of the trade not engaged in by the employer to whom he is apprenticed.

(4) An apprentice employed temporarily under subsection (3) shall not, for the purposes of subsections (1) and (2), be considered to be an apprentice of his temporary employer.

4(1) The term of apprenticeship shall consist of 3 periods of 12 months each.

(2) Each period referred to in subsection (1) shall consist of not less than 1800 hours of employment, inclusive of time spent attending technical courses prescribed by the Board.

(3) The Director may not, under section 25(1) of the Act, reduce the term of apprenticeship to be served by an apprentice to less than one period of apprenticeship.

5 When a contract of apprenticeship is registered with the Director, he shall issue to the apprentice an official record book referred to in section 14 of the General Regulations.

6(1) An apprentice shall not advance to the next period until the Director has authorized him to do so by making an entry in the apprentice's official record book under subsection (2).

(2) The Director shall make an entry in the apprentice's official record book authorizing advancement to the next period, when the apprentice

(a) has completed the previous period of apprenticeship,

(b) has received, in the opinion of the Director, a satisfactory report from

(i) his employer, and

(ii) the school at which he attended technical training courses prescribed by the Board,

(c) has completed the tests and examinations prescribed by the Board, and

(d) has attained pass marks prescribed by the Board in the tests and examinations referred to in clause (c).

7 The official record book of an apprentice shall be kept in the possession of his employer, and upon termination of the employment of the apprentice, the employer shall present the book to him.

8(1) An employer shall pay wages to an apprentice that are not less than the following percentages of the prevailing wages paid to a journeyman:

(a) 60% in the first period;

(b) 75% in the 2nd period;

(c) 90% in the 3rd period.

(2) Notwithstanding subsection (1), the wages paid to an apprentice shall not be less than the minimum wage fixed pursuant to The Alberta Labour Act, 1973.

(3) An employer is not required to pay wages to an apprentice during the time that the apprentice spends attending technical training courses prescribed by the Board.

9 The hours of work and working conditions of an apprentice shall be the same as those of a journeyman.

## Part 2

## CERTIFICATION

10 The Director may issue Certificates of Qualification in accordance with section 32 of the General Regulations.

11 In addition to section 32 of the General Regulations, the Director may issue a Certificate of Qualification for the trade without examination to a person who holds

(a) a Certificate of Completion of Apprenticeship in the trade issued by another province within Canada, or

(b) a Certificate of Qualification or a Certificate of Proficiency in the trade issued by another province within Canada bearing an Interprovincial Standards Red Seal.

12(1) Upon surrender of a valid Alberta Certificate of Qualification as a steel fabricator, the Director may, if he is satisfied that the experience of the person is, in fact, in the trade of boilermaker, issue a Certificate of Qualification as a boilermaker to that person.

(2) No fee shall be charged where a certificate is exchanged under subsection (1).

13(1) An application to take an examination for a Certificate of Qualification shall be made to the Director.

(2) Documentary evidence acceptable to the Director shall be presented by an applicant for an examination showing that the applicant

(a) holds a certificate equivalent to an Alberta Certificate of Qualification issued by a provincial authority outside Alberta, or

(b) has at least 4 years of acceptable work experience in the trade.

(3) The applicant shall provide translations into the English language acceptable to the Director, of credentials in a language other than English submitted pursuant to subsection (2).

14 A Certificate of Qualification issued under this regulation is effective unless cancelled or suspended by the Director in accordance with sections 42 and 43 of the General Regulations.

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